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# **RAV4** **EV**



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## **EMERGENCY RESPONSE GUIDE**

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## ABOUT THIS GUIDE

This guide is designed to acquaint emergency response personnel with the **TOYOTA RAV4 EV**. The guide provides illustrations and information to assist those responding to emergency conditions in meeting the following objectives:

- To identify a **TOYOTA RAV4 EV** that may have been involved in a crash or other emergency situation.
- To identify the location of key electrical components of the vehicle's drive and auxiliary systems.
- To identify the location and operation of devices which will secure the vehicle's drive and auxiliary systems.
- To identify the location and operation of the high-voltage service plug which will remove battery power from the vehicle's drive and auxiliary systems.
- To properly secure the vehicle for towing.

For additional questions about the **TOYOTA RAV4 EV**, please call Toyota EV Technical Assistance at 1-888-753-5233.

# TABLE OF CONTENTS

About This Guide ..... i

About the **TOYOTA RAV4 EV** ..... 2

Components Powered by High-Voltage Batteries ..... 4

Securing the **TOYOTA RAV4 EV** ..... 6

Disconnecting the **TOYOTA RAV4 EV** Traction Batteries ... 8

Towing the **TOYOTA RAV4 EV** ..... 10

MSDS Sheets ..... 12

## About the TOYOTA RAV4 EV

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### The TOYOTA RAV4 EV:

- Can be identified by the one electric charge receptacle on the right front fender as shown above.
- Will be a 4-door model only.
- Is powered by 24 Ni-MH batteries (12V each) for a total voltage of 288 volts. These batteries are contained in one battery pack located under the vehicle passenger floor.
- Utilizes a permanent magnet motor and the accessories that are powered only by the batteries.
- Battery type, "Ni-MH" (Nickel-Metal Hydride), is indicated on the back door.
- Has "EV" decal on side of vehicle.
- Has air intake vents on both rear quarter panels.

## Electrical Safety Requirements:

### **⚠ CAUTION**

The traction batteries store substantial amounts of energy, which can cause serious injury or death if not handled properly. Traction batteries should never be crushed or punctured. This could cause burns or possible explosion. High-voltage wiring (wrapped in orange-colored harnesses) should not be cut or touched if the conductor is exposed—this could cause shock, burns, or other serious injury.

- Vehicle or battery pack fire can be extinguished by using continuous large amounts of water  
— or —  
Class D powder extinguisher agent (Metal-X or equivalent).
- Battery voltage **will not** follow water back up a fire hose and cause shock to a firefighter when the vehicle is **not** connected to a charging device.
- **If the vehicle is connected to a charging device, DO NOT use water to extinguish a vehicle fire. Exercise the same precautions used when AC power supply potential exists.**
- SCBA (Self Contained Breathing Apparatus) should be used in fighting a vehicle fire.
- Mechanical or hydraulic extraction tools may be used in the passenger compartment but should **not** be used on the traction batteries, on energized components, or on components that might cause the traction batteries to be crushed or punctured. **Do not cut orange-colored harnesses (high-voltage wiring).**

## **Components Powered by High-Voltage Batteries**

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The components highlighted are powered by the **TOYOTA RAV4 EV** traction batteries. These components include:

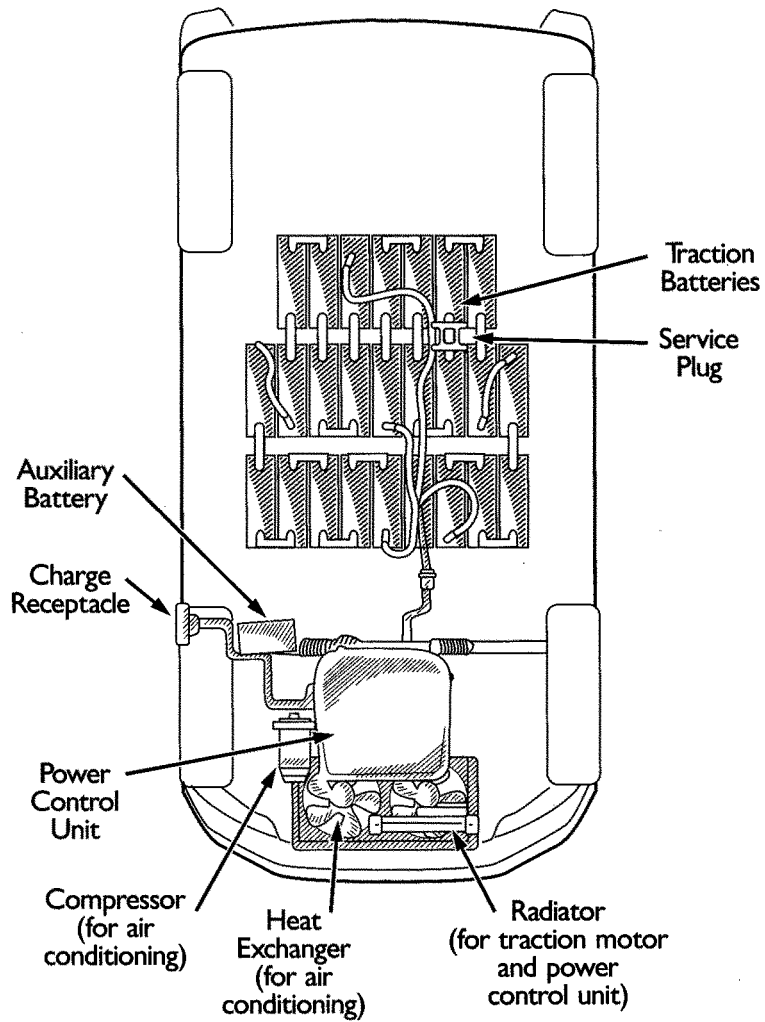
- Permanent Magnet Motor
- Power Control Unit
- Charge Receptacle
  - On the right front fender.

The traction battery pack and the components connected to it are completely insulated from the **TOYOTA RAV4 EV** interior and unibody frame.

**ALL HIGH-VOLTAGE WIRES AND HARNESSSES ARE INDICATED BY ORANGE-COLORED INSULATION OR WRAPPING.**

# Vehicle Component Location

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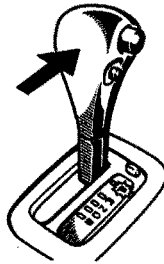


## **Securing the TOYOTA RAV4 EV**

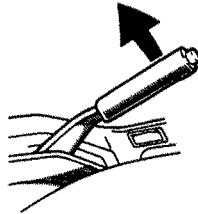
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The **TOYOTA RAV4 EV** is secured by:

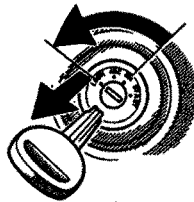
- Placing the selector lever in the “P” position.



- Applying the parking brake fully.



- Shutting off vehicle power by turning off the motor switch.





## **⚠ CAUTION**

Securing the TOYOTA RAV4 EV assures that it will not operate inadvertently. However, it does not disconnect the individual traction batteries or cut off battery-pack voltage potential.

## **⚠ CAUTION**

The TOYOTA RAV4 EV makes virtually no noise when the drive system is powered and the vehicle is parked or stopped. Never assume the TOYOTA RAV4 EV is off simply because it is silent.

## **⚠ CAUTION**

Do not attempt to jump start the TOYOTA RAV4 EV traction batteries. The traction batteries can only be recharged by using a special charging station.

If the auxiliary battery is dead or has low voltage, it can be jump started using any conventional 12V battery jump-starting equipment.

## **⚠ WARNING**

**Do not use  
high-voltage (> 12V)  
jump-start equipment**

## **Disconnecting TOYOTA RAV4 EV Traction Batteries**

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In an emergency, the **TOYOTA RAV4 EV** traction batteries may be disconnected from all vehicle systems and circuits by using the “service plug” as shown.

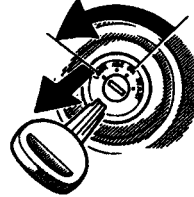
**USE EXTREME CAUTION WHEN PERFORMING THIS OPERATION.**

### **! WARNING**

The “service plug” **DOES NOT** disable the individual traction batteries. Do not cut into the traction battery pack or penetrate the traction batteries in any way, **EVEN WITH THE “SERVICE PLUG” PULLED OUT.**

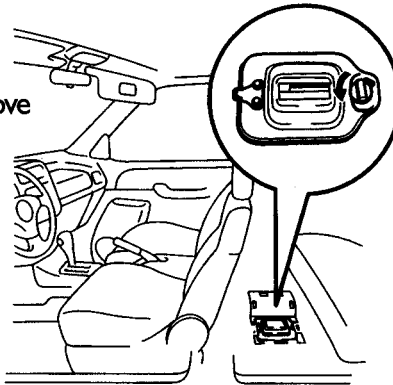
The traction battery pack is connected through a main fuse in the battery tray, which will open if there is a high electrical overload or short circuit. The main fuse will disconnect the traction batteries from all components.

A. Make sure the motor switch is off.

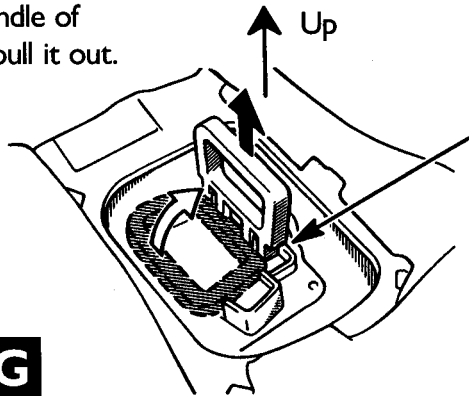


B. Peel back the carpet from the left-hand rear passenger footwell.

C. Turn the lock knob and remove the service plug cover.



D. Carefully raise the handle of the service plug and pull it out.

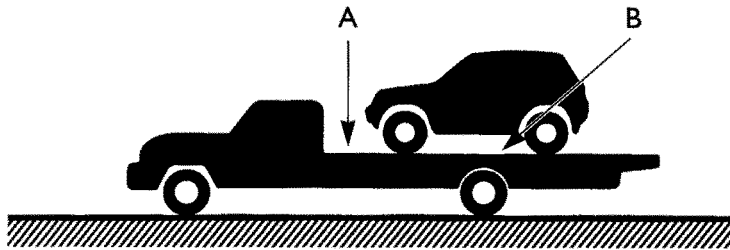


**⚠ WARNING**  
**288 Volt**  
**Battery Pack**

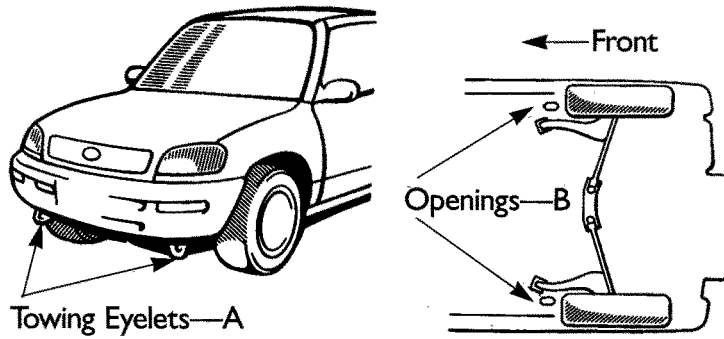
## Towing the Toyota RAV4 EV

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The **TOYOTA RAV4 EV** should be towed using a flatbed truck.

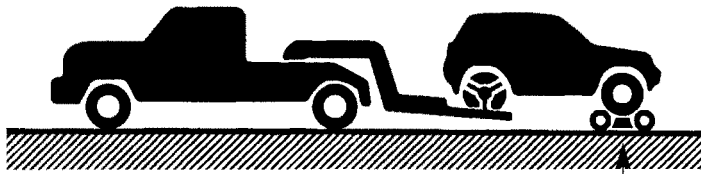
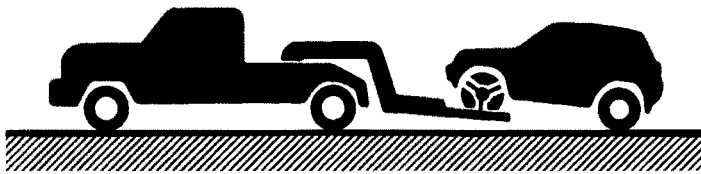


The vehicle should be tied down using the front towing eyelets "A" and the rear openings "B."



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A wheel lift-type truck may also be used as shown.



**FRONT WHEELS SHOULD  
NOT BE ON THE GROUND  
— USE A TOWING DOLLY.**

# **MATERIAL SAFETY DATA SHEET**

## **Nickel/Metal Hydride Battery**

### **SECTION I – Chemical Product & Company**

Manufacturer's Name Panasonic EV Energy Co., Ltd.	Manufacturer's Emergency Telephone Number (81)-53-577-3112. Munehisa Ikoma
Manufacturer's Mailing Address 555 Sakai juku, Kosai, Shizuoka 431-04 JAPAN	Data Prepared May 28, 1997
	Signature of Preparer (Optional)

### **SECTION II – Hazardous Ingredients/Identity Information**

Hazardous Components (Specific Chemical Identity; Common Name(s) )	OSHA PEL	ACGIH TLV	Other Limits Recommended	Formulation (%)	W/Y
Ni (OH) <sub>2</sub>				0~21%	W
NiOOH				1~22%	W
MmNiCoMnAl				2~31%	W
(MmNiCoMnAl) Hx				3~32%	W
KOH and NaOH and LiOH				12%	W

Other Material:

Battery Case: Plastics (PPE/PP Blend)

PPE: Poly Phenylene Ether

PP: Polypropylene

Separator: Polypropylene-Polyolefin mixed Sheet

### SECTION III – Physical/Chemical Characteristics

Boiling Point	Approximate 170°C	Specific Gravity (H <sub>2</sub> O=1)	2.4
Vapor Pressure (mm Hg)	N/A	Melting Point	N/A
Vapor Density (Air=1)	N/A	Evaporation Rate (Butyl Acetate=1)	N/A
Solubility in Water (v/v)	N/A		

Appearance and Odor

- Note:
- Nickel/Metal hydride battery is solid and sealed by the plastic case. It will not generate any gas in the static situation. It remains solid when exposed to air and/or water in the static situation.
  - May generate Oxygen gas (O<sub>2</sub>) when overcharged. May generate Hydrogen gas (H<sub>2</sub>) when over discharged. Excess gas pressure may be vented from safety vents. Speed and generation volume depend on severity of overcharge/over discharge condition.

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## SECTION IV – Fire and Explosion Hazard Data

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Flash Point (Method Used)	N/A	Flammable Limits	L&L LEL	L&L UEL
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- Note:
- No flash or explosion in the normal situation.
  - Flash may be possible in the following cases:
    - Sparking caused by short circuit
    - Intentionally discharging the cell and/or the module battery with the extremely high current.
  - Explosion may be possible in the following case:  
If battery cell is overcharged/over discharged, excess gas pressure may be vented by safety valves; however, if battery cell is housed in a completely sealed vessel, explosion may occur with ignition source, because of accumulated O<sub>2</sub> or H<sub>2</sub> gas.
  - Unusual fire and explosion hazards.

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### Extinguishing media

- CO<sub>2</sub>
- Sand
- Continuous large amounts of water
- Class D powder extinguisher agent (Metal-X or equivalent)

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### Special Fire-fighting Procedures

N/A

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### Unusual fire and explosion hazards

- In the abnormal usage, there is the possibility of explosion.
- The abnormal usage condition:
  - Cell was overcharged and over discharged.



- Cell was higher than 100°C.
- In the completely sealed vessel, the cell was discharged and charged and in the vessel the ignition source existed.

### SECTION V – Reactivity Data

Stability	Unstable			Conditions to Avoid
Stable	Stable	○		

Incompatibility (Materials to Avoid)

N/A

Hazardous Decomposition or By-products

- Disassembling the module battery
- Disassembling the single cell

- • Danger of short-circuiting.
- • Danger of short-circuiting.
- Alkaline liquid out.
- Alkaline liquid to the skin.

Hazardous Polymerization	May Occur			Conditions to Avoid
	Will Not Occur	○		

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## SECTION VI – Health Hazard Data

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Route(s) Entry:	Inhalation?	Skin?	Ingestion?
• Inhalation:	Poisonous gas will not be generated. Inhalation of any produced gas will not cause any harm.		
• Skin:	In the normal situation, no damage to skin. However, in the abused situation the electrolyte (alkaline liquid) will be leaked out of the case, which may damage the skin if touched.		
• Ingestion:	No ingestion		

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### Health Hazards (Acute and Chronic)

Will not give any hazards in the long run. However, leaked alkaline liquid may damage the skin if touched.

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Carcinogenicity:	TNP?	IARC Monographs?	OSHA Regulated?
No Carcinogen			

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Signs and Symptoms of Exposure

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Medical Conditions Generally Aggravated by Exposure

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Emergency and First Aid Procedures

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## SECTION VII – Precautions for Safe Handling and Use

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Steps to Be Taken in Case Material is Released or Spilled

Don't disassemble the battery cell. If the battery cell is disassembled, store underwater immediately, and take precautions so alkaline electrolyte does not come into contact with skin or eyes.

If it was put into the eyes, eyes shall be washed out immediately with large amount of water and/or boric acid aqueous solution.

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Waste Disposal Method

To be disposed in the discharged condition.

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Precautions to Be Taken in Handling and Storing

Never short-circuit the cells and/or the module battery. If short-circuited, may cause burns or injuries.

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Other Precautions

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## SECTION VII – Control Measures

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Respiratory Protection (Specify Type)

In the normal condition, it is not needed specifically.

Ventilation	Local Exhaust	Special
	Mechanical (General)	Other

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Note: • Do not store or use the battery module in a completely sealed container.

Protective Gloves

Rubber

Eye Protection

Wear splash-proof goggles

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Note: • Use recommended skin and eye protection when handling or disassembling a battery cell/module.

Other Protective Clothing or Equipment

N/A

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Work/Hygienic Practices

N/A

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